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Balancing the Energy Tank

Overview



- **Energy and energy balance**
- **Calculate energy needs**
- **Desirable weight for SOF**



Units of Energy

- Kilocalorie (kcal) and calories are interchangeable terms, thus:**

1 kcal = 1 Calorie



Sensitivity of Energy Balance



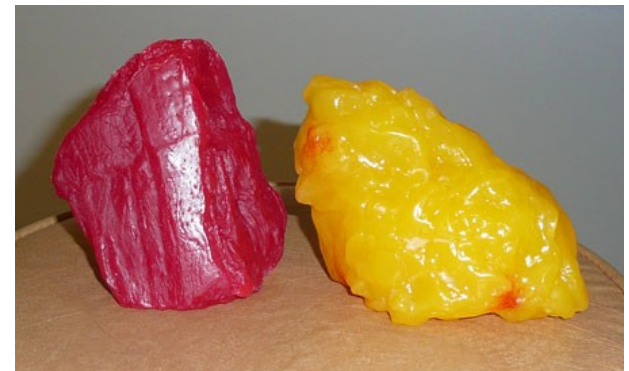
- **1 lb = 3,500 kcals**
 - **To gain 1 lb an extra 3,500 kcals must be consumed**
 - ***Its easy to put on 1 lb a week with an extra 500 kcals a day!***
 - **To loose 1 lb in one week:**
 - ***Eat 250 fewer kcals/day and burn an extra 250 kcals***



Examples of Energy Balance



- **Drinking one extra beer/day would add 145 extra kcal/day of energy**
- **Drinking one extra beer/day for 1 year would provide 52,925 kcal ($145 \text{ kcal} \times 365 \text{ days / year}$) or the equivalent of 15.1 lbs/year**



Components of Energy Expenditure



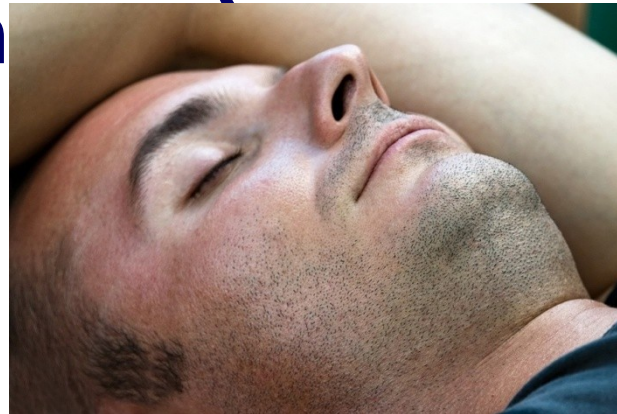
- **Three major contributors to energy expenditure are:**
 - **Resting energy expenditure (REE)**
 - *Energy required to maintain life*
 - **Physical activity (PA)**
 - **Thermic effect of food (TEE)**
 - *Energy to digest foods*



Resting Energy Expenditure



- **Resting Energy Expenditure (REE):** amount of energy needed to maintain life (i.e. breathing, maintaining body temperature)



Calculations for REE



- **Find your age bracket, then use appropriate formula**
 - Example: Age=33
 - Formula: $5.27 \times \text{Weight} + 879$

Age (yrs)	Equation to Derive REE (kcal/day)
18 - 30	$6.95 \times \text{Weight} + 679$
31 - 60	$5.27 \times \text{Weight} + 879$

Calculating REE

Resting Energy Expenditure (REE) for Men

Choose Age and Weight

Age Range	18-30	yrs
Body Weight	140	lbs
REE for Men	Total	
Total	1652	kcal

* Range: 120 lbs - 350lbs



Physical Activity Energy Expenditure



- **Activity levels vary from day to day**
- **Actual energy expenditure can be estimated**
- **Physical activity energy expenditure can be estimated**





Physical Activity Factors for Various Levels of Activity



Category	Factor
Very Light - seated and standing activities, driving, playing cards	1.3
Light - walking, carpentry, sailing, playing ping-pong or pool, golf	1.6
Moderate - carrying a load, jogging, light swimming, biking, calisthenics, scuba diving	1.7
Heavy - walking with a load uphill, rowing, digging, climbing, soccer, basketball, running, obstacle course	2.1
Exceptional - running/swimming races, cycling uphill, carrying very heavy loads, hard rowing	2.4

Estimating Total Energy Expenditure



- **Take REE value and multiply it by a number (factor) based on expected physical activity**





Calculating Energy Expenditure



- ***Example:***

You are 23 years old, weigh 200 lbs, and your activity is heavy

$$\begin{aligned}\text{REE} &= 6.95 \times \text{Weight} + 679 \\ &= 6.95 \times 200 \text{ lbs} + 679 \\ &= 2,059 \text{ kcal/day}\end{aligned}$$

Taken from
Physical
Activity Factor
Chart

- **Total Energy Needs = 2,059 x 2.1 = 4,324 kcal/day**

Estimating Total Daily Energy Needs

Choose Exertion Level

Exertion Level	Very Light
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Exertion Factor	Total
Total	1.3

Total Daily Expenditure	
Total	2148

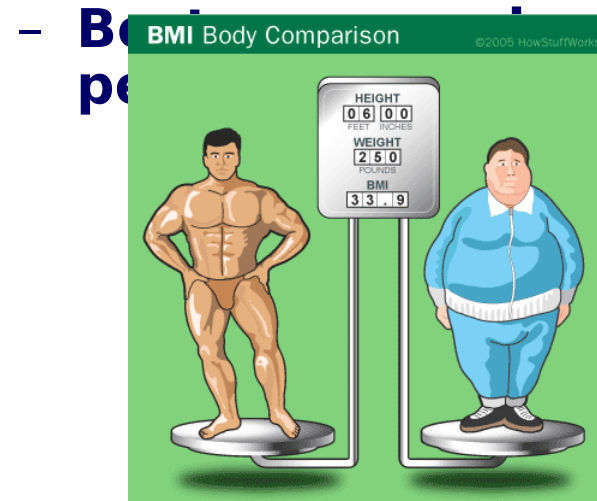
kcal

Body Size and BMI



- **Body Mass Index (BMI)**
 - Estimates percent body fat
 - Classifies persons into underweight, normal, over-fat, or obese categories
 - $Wt \text{ in kg} / (Ht \text{ in m})^2$
- **Special chart for SOF based on height and weight data**

- **BMI does not accurately assess body fat for SOF warriors due to higher muscle composition.**



Body Mass Index Table for SOF																	
	Typical SOF Operator									Check Body Fat				Overweight			
BMI	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	40
Height (inches)	Body Weight (pounds)																
58	96	100	105	110	115	119	124	129	134	138	143	148	153	158	162	167	191
59	99	104	109	114	119	124	128	133	138	143	148	153	158	163	168	173	198
60	102	107	112	118	123	128	133	138	143	148	153	158	163	168	174	179	204
61	106	111	116	122	127	132	137	143	148	153	158	164	169	174	180	185	211
62	109	115	120	126	131	136	142	147	153	158	164	169	175	180	186	191	218
63	113	118	124	130	135	141	146	152	158	163	169	175	180	186	191	197	225
64	116	122	128	134	140	145	151	157	163	169	174	180	186	192	197	204	232
65	120	126	132	138	144	150	156	162	168	174	180	186	192	198	204	210	240
66	124	130	136	142	148	155	161	167	173	179	186	192	198	204	210	216	247
67	127	134	140	146	153	159	166	172	178	185	191	198	204	211	217	223	255
68	131	138	144	151	158	164	171	177	184	190	197	203	210	216	223	230	262
69	135	142	149	155	162	169	176	182	189	196	203	209	216	223	230	236	270
70	139	146	153	160	167	17	181	188	195	202	209	216	222	229	236	243	278
71	143	150	157	165	172	179	186	193	200	208	215	222	229	236	243	250	286
72	147	154	162	169	177	184	191	199	206	213	221	228	235	242	250	258	294
73	151	159	166	174	182	189	197	204	212	219	227	235	242	280	257	265	302
74	155	163	171	179	186	194	202	210	218	225	233	241	249	256	264	272	311
75	160	168	176	184	192	200	208	216	224	232	240	248	256	264	272	297	319
76	164	172	180	189	197	205	213	221	230	238	246	254	263	271	279	287	328

Key Points



- **Body weight remains constant when:**
 - Energy intake = energy expenditure
- **To lose or gain one pound of weight:**
 - 3,500 calories must be expended or consumed
 - Resting Energy Expenditure and daily activities are used to estimate of total energy expended in one day
- **Body Mass Index (BMI) is not a good tool for SOF body fat estimate**

